

Patent Application No. 10/520,365
Art Unit: 3681

Claims

1. An eccentric gear box consisting of at least one gear engagement mechanism, at least two eccentric gear pairs with different ratios between number of teeth of its individual gears, at least one input shaft, at least one output shaft and multiple eccentrics;

wherein each eccentric gear pair consists of one circular gear, with internal gear teeth, in mesh with another circular gear with external gear teeth; wherein number of external gear teeth is less than the number of internal gear teeth; wherein one of the gears of eccentric gear pair is a revolving gear and the other gear is a fixed orientation gear;

wherein multiple eccentrics are mounted on fixed orientation gear as to keep its orientation fixed while allowing its axis to revolve around the axis of revolving gear; revolving gear is free to revolve around its axis, which is common axis to all eccentric gear pairs; eccentrics associated with same eccentric gear pair have approximately equal eccentricity; individual eccentric revolves around its fixed axis and is free to revolve with respect to the associated fixed orientation gear;

wherein one eccentric associated with each fixed orientation gear is mounted on input shaft; wherein revolving gears associated with individual eccentric gear pairs, are connected to output shaft; at least one gear engagement mechanism is employed to select an eccentric gear pair to be effectively engaged between input shaft and output shaft as to revolve input and output shafts with speed ratio that is obtained from selected eccentric gear pair.

2. An eccentric gear box consisting of at least one gear engagement mechanism, at least two eccentric gear pairs with different ratios between number of teeth of its individual gears, at least one input shaft, at least one output shaft and multiple eccentrics;

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wherein each eccentric gear pair consists of one circular gear, with internal gear teeth, in mesh with another circular gear with external gear teeth; wherein number of external gear teeth is less than the number of internal gear teeth; wherein one of the gears of the eccentric gear pair is a revolving gear and the other gear is a fixed orientation gear;

wherein multiple eccentrics are mounted on fixed orientation gear as to keep its orientation fixed while allowing its axis to revolve around the axis of revolving gear; revolving gear is free to revolve around its axis, which is common axis to all eccentric gear pairs; eccentrics associated with same eccentric gear pair have approximately equal eccentricity; individual eccentric revolves around its fixed axis and is free to revolve with respect to the associated fixed orientation gear;

wherein one eccentric associated with each eccentric gear pair is engaged with individual driving gear mounted on input shaft through a driven gear that is coaxially fixed with the eccentric; wherein revolving gears associated with individual eccentric gear pairs, are connected to output shaft; at least one gear engagement mechanism is employed to select an eccentric gear pair to be effectively engaged between input shaft and output shaft as to revolve input and output shafts with speed ratio that is obtained from selected eccentric gear pair.

3. An eccentric gear box as claimed in claim 1, wherein input shaft is rigidly connected to the eccentrics mounted on it; and the revolving gears are connected to output shaft in such a way that at a time the gear engagement mechanism can engage any one of the revolving gears to output shaft as to select speed ratio of any eccentric gear pair, between input shaft and output shaft, while rest of the revolving gears revolve freely with respect to output shaft.

4. An eccentric gear box as claimed in claim 1, wherein revolving gears are rigidly connected to output shaft and gear engagement mechanism can engage input shaft with at least one eccentric associated with any fixed

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orientation gear as to select speed ratio of any eccentric gear pair, between input shaft and output shaft, while eccentrics associated with other fixed orientation gears are free to revolve with respect to input shaft.

- 5 5. An eccentric gear box as claimed in claim 1, wherein two gear engagement mechanisms are employed to simultaneously engage input shaft with at least one eccentric and output shaft with the revolving gear associated with same eccentric gear pair; eccentrics and revolving gears associated with other eccentric gear pairs are free to revolve with respect to input shaft and output shaft respectively; this way only one of the eccentric gear pairs is engaged between input shaft and output shaft.
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- 15 6. An eccentric gear box as claimed in claim 2, wherein input shaft is rigidly connected to the driving gears mounted on it; and the revolving gears are connected to output shaft in such a way that at a time the gear engagement mechanism can engage any one of the revolving gears to output shaft as to select speed ratio of any one eccentric gear pair, between input shaft and output shaft, while rest of the revolving gears revolve freely with respect to output shaft.
- 20 7. An eccentric gear box as claimed in claim 2, wherein revolving gears are rigidly connected to output shaft and gear engagement mechanism can engage input shaft with at least one driving gear mounted on it as to select speed ratio of any one eccentric gear pair, between input shaft and output shaft, while other driving gears mounted on input shaft and eccentrics associated with other eccentric gear pairs are free to revolve with respect to input shaft.
- 25 8. An eccentric gear box as claimed in claim 2, wherein two gear engagement mechanisms are employed to simultaneously engage input shaft with one driving gear mounted on it and output shaft with the revolving gear associated with same eccentric gear pair; other driving gears mounted on input shaft and eccentrics and revolving gears associated with other eccentric gear pairs are free to revolve with respect to input shaft and output
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shaft respectively; this way gear engagement mechanism at a time engages only one of the eccentric gear pairs between input shaft and output shaft

9. An eccentric gear box as claimed in claims 1 to 8 that consists of at least one additional eccentric gear pair that is identical to one of the eccentric gear pairs of the eccentric gear box; wherein corresponding components of the identical eccentric gear pairs are simultaneously engaged to the input and output shafts respectively.

10. An eccentric gearbox as claimed in claims 1 to 8 in which the input shaft is used as output shaft and the output shaft is used as input shaft.